Sebastian Troitzsch

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Highlights

- **Current Position**: Postdoc in Energy Systems research with a focus on Electric Mobility at the Systems Science department, Institute for High Performance Computing (IHPC), A*STAR, Singapore
- **Doctoral Project**: Multi-Energy System Modeling und Optimization (MESMO) – Development of a Software Tool for District-Scale Electric and Thermal Energy System Operation, available as open-source software at GitHub: https://github.com/mesmo-dev/mesmo
- **Energy Engineering Skills**: Optimal Power Flow (OPF), Model Predictive Control (MPC), District-Scale Multi-Energy Market Organization with Distribution Locational Marginal Prices (DLMPs), Mathematical Modelling of Electric Grids / Thermal Grids / Distributed Energy Resources (DERs)
- **Software Skills**: Python, Julia, SQL via SQLite, CI/CD via GitHub Actions, ZeroMQ Messaging
- **Numerical Optimization Skills**: LP/QP/SOCP/MILP via Gurobi/CPLEX, Genetic Algorithms via DEAP
- **Language Skills**: English (Full professional proficiency), German (Native proficiency)

Work Experience

Institute for High Performance Computing, A*STAR, Singapore: Scientist **09/2021 – present**

- Project: Singapore Integrated Transport Energy Model (SITEM)
- Development of a Python-based Co-Simulation-Platform for MESMO and the City Mobility Simulator (CityMoS) to evaluate the potential of Smart Charging and Vehicle-to-Grid (V2G) applications.

TUMCREATE, Singapore: Research Associate / PhD Thesis **01/2017 – 08/2021**

- Projects: Platform for Interconnected Microgrid Operation (PRIMO), Connecting Energy & Power Systems for Future Singaporean New Towns (CONCEPT)
- Software Projects: Multi-Energy System Modeling and Optimization (MESMO), Control-oriented Building Model (CoBMo)
- Supervision of 4x Master theses and 4x student internships, each to the extent of 6 months.

TUMCREATE, Singapore: Research Assistant / Master Thesis **04/2016 – 11/2016**

- Project: Model Predictive Control for Co-Optimization of Distribution Grid Congestion and Thermal Comfort in Office Buildings
- Development of model-predictive-control algorithms for building climate systems in commercial buildings to participate in Demand Response (DR) and Flexible Load (FL) programs.

Institute for Energy Efficient Buildings, RWTH Aachen: Student Assistant **06/2015 – 04/2017**

- Development of a LabVIEW-based control system for a test chamber to enable human-subject-based studies of indoor air comfort with DR-enabled heating systems in residential buildings.

Robert Bosch SEA, Singapore: Research Internship **01/2015 – 04/2015**

- Conception of an Arduino-based test field for studies on indoor air comfort in office buildings, and coordination with various stakeholders to implement the system.

Robert Bosch GmbH, Stuttgart: Research Internship / Bachelor Thesis **10/2013 – 07/2014**

- Bachelor Thesis: Grey-Box-Modelling of Commercial Buildings using a Maximum-Likelihood-Approach
- Development of a data-driven modelling-tool in MATLAB for the thermal simulation of commercial buildings, to reduce the need for manual acquisition of technical building parameters.

Institute of Power Systems and Power Economics, RWTH Aachen: Student Assist. 01/2013 – 09/2013

- Implementation of graphical user interfaces for the interaction with a MATLAB-based transmission system simulator of the interconnected European power system.

Education

Technical University of Munich (TUM): PhD, Electrical Engineering 04/2017 – 08/2021

- PhD Thesis: Multi-Energy System Modeling und Optimization (MESMO) – Development of a Software Tool for District-Scale Electric and Thermal Energy System Operation
- Supervisor: Prof. Thomas Hamacher, Chair of Renewable and Sustainable Energy Systems.
- Thesis submitted in August 2021; defense expected in April 2022.

RWTH Aachen University: Master of Science, Energy Engineering 04/2015 – 03/2017

- Major in Energy Engineering with specialization in Renewable Energy Systems, final grade: 1.8
- Recipient of the Deutschlandstipendium scholarship in 2015.

National University of Singapore: Exchange Semester 08/2014 – 12/2014

- Thematic Focus: Modelling and Control of Building Energy Systems in the Tropics.

RWTH Aachen: Bachelor of Science, Mechanical Engineering 10/2010 – 07/2014

- Major in Mechanical Engineering with specialization in Energy Engineering, final grade: 1.9
- Member of the Dean's List of the Mechanical Engineering faculty in 2013.

Research Projects

Singapore Integrated Transport Energy Model (SITEM) 05/2020 – present

- Project Partners: Institute for High Performance Computing, A*STAR und TUMCREATE.
- Goal: Co-simulation of electrified transport systems and the electric distribution system in Singapore based on MESMO and the City Mobility Simulator (CityMoS) to support power system expansion planning and the development of technical guidelines for the erection of charging infrastructure.

Platform for Interconnected Microgrid Operation (PRIMO) 01/2017 – 08/2021

- Project Partners: EDF Lab Singapore, TUMCREATE, Singapore Institute of Technology (SIT) und Nanyang Technological University (NTU).
- Goal: Development of a control system for the operation of micro-grids and cost-optimal dispatch of flexible DERs in direct coordination with neighboring micro-grids and under participation in the spot market of the national electricity market in Singapore.

Connecting District Energy & Power Systems in Future New Towns (CONCEPT) 01/2018 – 02/2019

- Project Partners: Singapore-ETH Centre (SEC) und TUMCREATE.
- Outcome: Methodology for the coordinated district-level planning of electric power systems and operation of flexible loads, which achieves investment cost savings of 25 % through peak shaving.

Volunteering

Project Cebu 2014 12/2014

Overseas community aid project to Cebu Island in the Philippines.

- Volunteered as a teacher in the preparation and conduct of IT and language lessons.

Project Velocity Aachen 01/2013 – 09/2013

Student project to implement a bicycle rental system in the city of Aachen.

- Liaised with public stakeholders to identify rental station locations and requirements for the system.

Energie Forum Aachen (Energy Club) 11/2011 – 04/2017

Student organization to educate and discuss energy technology and politics advancements.

- Founding member and board member from 09/2012 to 09/2013.